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NASA Ames Research Center
Attn: Michael Wright, PhD
Senior Research Scientist
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To Whom It May Concern:

The purpose of this letter is to endorse, with great enthusiasm, the nomination of the Data Parallel Line Relaxation (DPLR) Computational Fluid Dynamics (CFD) Code software for NASA's Software of the Year Award. This recommendation is based on the significant role the DPLR software played during the Space Shuttle Return-to-Flight activities to develop and implement the necessary understanding needed to provide real time mission support for Orbiter Thermal Protection System damage assessments. Conventional ground based wind tunnels do not have the capabilities to model the requisite flow physics associated with Orbit reentry from International Space Station missions. High fidelity computational analyses are a necessary component of ground based testing and analyses, and subsequent flight extrapolation of reentry aerothermodynamic heating environments. Significant and thorough benchmarking has been performed in order to verify the software implementation and physical models employed by DPLR. Although the code has been compared to historical data, Dr. Wright continues to find new test cases to demonstrate the accuracy of the code. In addition, the DPLR user community continues to perform additional validation studies under the guidance of Dr. Wright. These on-going activities to improve the basis of the DPLR software are a significant example of Dr. Wright's sincere interest in following through on implementation of user defined improvements. Because of Dr. Wright's significant motivation to make the utilization of the DPLR software a valuable component of Orbiter reentry aerothermodynamic heating environment definitions, he is also very responsive to questions about how best to make use of this important tool.

My organization has chosen to make extensive use of the DPLR software because it combines proven numerical algorithms and modern software development practices to provide robust simulations and achieve scalable performance. The software achieves high performance on a wide range of massively parallel computing architectures due to its well planned implementation. Further, the software structure has proven flexible enough to allow for improvements in core functions such as turbulence modeling and grid adaptation without requiring significant modification to the core of the code.

Without a doubt, the DPLR software is a critical component in successful hypersonic aerotheromodynamic heating community support to the Orbiter Project. For this reason, and those given above, I am in full support of the DPLR Code nomination for this year NASA's Software of the Year Award.

Cordially,

Charles H. Campbell
Orbiter Entry Aeroheating NASA Subsystem Engineer